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**APPLICATION
FOR
UNITED STATES LETTERS PATENT**

Title: THERMAL PRINTING A TWO-COLOR SALES RECEIPT

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THERMAL PRINTING A TWO-COLOR SALES RECEIPT

Field of the Invention:

5 The present invention relates to printing sales receipts and, more particularly, to methods of enhancing the appearance of, and safeguarding, sales receipts by inclusion of watermarks, strike-throughs, and circles-about-an-item, all of which can be printed in two colors and in real time.

BACKGROUND OF THE INVENTION

10 Printing sales receipts in two colors is well known in the art. The two colors, such as red and black, draw attention to and emphasize certain important items on the receipt, such as sales tax, discounts, and non-taxable items.

15 This invention reflects the discovery that the appearance of sales receipts can be improved by adding a strike-through function, a watermark, and a circle-about-an-item. In addition to enhancing the appearance of the

receipt, these added functions also improve the security of
the receipt against erasures, forgeries, and receipt
duplications. For example, the strike-through function can
be used to void certain items and to emphasize a discounted
5 item. The watermark function is intended to embed a design,
logo, or graphic into the receipt paper. The embedded
design is useful in thwarting counterfeit receipts,
distinguishing between original and duplicate receipts, and
generally discouraging attempts to commit fraud. The
10 circle-about-an-item function is extremely effective in
emphasizing certain items.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is
provided methods of enhancing the appearance of, and
15 safeguarding, sales receipts. The methods of this invention
provide sales receipts with watermarks, strike-throughs and
circles-about-an-item. These added functions can be
accomplished in real time; some of them can be printed in
differentiating colors. The strike-through function is
20 obtained by selectively adding a dot row to the center of
the font cell. The strike-through has application in

voiding purchased items, and in emphasizing the old price in
a discounted item. The watermark function embeds a
predefined logo or graphic into the receipt paper, in order
to discourage fraud and counterfeiting. The watermark
5 process prints the watermark in red, which cannot be copied
on black print only copiers. The graphic is filtered to
provide a faded background image. The method of adding a
circle to surround a printed item can be selected to
highlight specific text. The circle can be partially broken
10 or completely closed. The method uses a set of four command
parameters.

It is an object of this invention to provide methods of
enhancing and safeguarding printed sales receipts.

It is another object of the invention to provide
15 methods of adding strike-throughs, watermarks, and circles-
about-an-item for two-color sales receipts.

BRIEF DESCRIPTION OF THE DRAWINGS

A complete understanding of the present invention may
be obtained by reference to the accompanying drawings, when

considered in conjunction with the subsequent detailed description, in which:

FIGURE 1 illustrates a plan view of a typical font cell being modified to provide a strike-through function;

5 FIGURE 2 depicts a plan view of a strike-through being used to emphasize the new sale price of a sales item;

FIGURE 3 is a flow chart for the method of providing a strike-through for a sales receipt;

10 FIGURE 4 illustrates a flow chart diagram for the process of generating a watermark on a sales receipt;

FIGURE 5 depicts a plan view of printed sales receipt items featuring the circle-about-an-item function, in accordance with this invention; and

15 FIGURE 6 is a flow chart of the method of providing the circle-about-an-item function as shown in FIGURE 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Generally speaking, the invention features three methods of enhancing the appearance of, and safeguarding, sales receipts. The methods of this invention provide sales receipts with watermarks, strike-throughs, and circles-about-an-item. These added functions can be accomplished in real time; some of them can be printed in distinguishing colors.

Now referring to FIGURE 1, a typical font cell 10 for standard ASCII text is shown. The font cell 10 was obtained with a 203 dpi thermal printer. The font cell 10 is thirteen dots wide by twenty-four dots high.

In order to achieve a strike-through, a command is given by the user through the print keyboard (not shown), that selectively adds a dot row 12 to the center of the font cell 10. The additional dot row 12 comprises the same color as does its destination character or characters. The strike-through function is illustrated in FIGURE 2. It is often used to void purchased items, sales prices, etc. and to highlight discount pricing.

Referring to FIGURE 3, a flow chart 100 depicts the method used to obtain the strike-through, shown in FIGURE 2. From font memory 101, font data is read, step 102. The data is then stored in temporary memory 104, step 103. If the data has been properly extracted, step 105, then color information is added, step 106. If the data has not been properly extracted, step 105, then block 102 is re-entered via feedback loop 107.

Having properly appended the color information, step 106, this is stored in temporary memory 104. After the color information has been appended, the dots used for the strike-through function are inserted, step 109. This information is also sent to temporary memory 104. The temporary information is then copied into a text frame buffer 114, step 112. The program sequence then returns to the command parser.

The watermark function is a real-time operation that is intended to embed a logo or design into the sales receipt, in order to prevent fraud by fabricating a counterfeit or erroneous receipt. The watermark function combines arbitrary text (i.e., receipts with a predefined logo or graphic). The logo or graphic is filtered in order to

achieve a faded effect. The faded logo is then merged, in
real time, with the text stream. The result is a receipt
with a faded image in the background. The graphic is
printed in red only. The red watermark discourages
5 counterfeit, because the graphic is difficult to
photocopy.

Referring to FIGURE 4, a block diagram is shown of a
flow chart 200, showing the method of achieving a watermark
when printing a sales receipt. After receipt of a print
10 engine interrupt signal 201, the system determines whether
the watermark is enabled, step 202. When the watermark is
enabled, a raster is read from logo memory 204, step 203. A
fade filter is then applied, step 205, and the graphic is
then merged with text, step 208, which is secured from a
15 frame buffer 207. The text can be sent to the print head
either directly, step 210, or from the merged graphic, step
211. The program sequence then returns to the command
parser, step 212.

The circle-about-an-item command is designed to allow
20 the user to circle one to four lines of ASCII text at any
location on the receipt. The circle is intended to provide
an additional method for highlighting or emphasizing some

section of the receipt. The command can be selected to create a closed or partially broken circle or any other regular or irregular surrounding shape, as shown in FIGURE 5. The command uses a set of four command parameters with two parameters used to initiate the sequence. The user, therefore, must transmit six, one byte data segments. A typical sequence is illustrated below, in hexadecimal form:

1B_h XX_h Field1_h Field 2_h Field 3_h Field 4_h

As aforementioned, the command is composed of six segments, of which the first segment 1B_h is an industry standard character (ESC). This character designates a command sequence. The second segment XX_h refers to an undefined command code. This code is used to signify the real-time circle sequence. The last four parameters (Field1_h through Field4_h) are used as coordinate and image selection controls. Table 1, shown below, illustrates the use of these fields.

Table 1

Field 1	Lefthand Center/Loci. Number is based on the maximum allowable characters per line.
Field 2	Righthand Center/Loci. Number is based on the maximum allowable characters per line.
Field 3	Y axis dimension. This is limited to a range of 1 through 4. The field specifies the number of lines that the circle will encompass.
Field 4	Equation/Image selection (i.e., Closed circle, broken circle, other shape, etc.)

Referring to FIGURE 6, a flow chart 300 is shown for providing a circle about a number of lines of text in a sales receipt. A print engine interrupt signal 301 is received. The system determines if the circle is enabled, step 302. When the circle is enabled, a loci is placed in temporary memory 304, step 303. Next, a decision is made as to whether the circle is to be closed or broken, step 305. If the broken circle is formed, step 306, it is merged with text, step 308, which is secured from the frame buffer 307. If a closed circle is formed, step 309, it is merged with text, step 308, which is likewise secured from the frame buffer 307. The text can be sent to the print head either directly, step 310, or from the merged text and circle image, step 311. The program sequence then returns to the command parser, step 312.